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eight species, of which five are new, while the others have all been found in the Corallian or Kimmeridgian of other localities. The beds are thus proved to be Upper Jurassic.——In the specimen of Archæopteryx in the Berlin Museum, those parts are preserved which are wanting in the example in the British Museum, and the pelvis, hind-limbs, and more perfect tail supply valuable details. These are worked up in the memoir "Ueber Archæopteryx" in the Palaeontologische Abhandlungen, Berlin, 1884, by W. Dames.

Cretaceous.—The variability of ancient species is well demonstrated by five abnormal specimens of Hemiaster from the cretaceous of Constantine, Algeria. In some of these one of the ambulacral areas is entirely or partially atrophied, while in others there is a doubling of one of the ambulacra. These animals, provided with four or six ambulacra, attained as full a growth as normal examples.

Tertiary.—The series of tertiary deposits which lie along the Alsatian slope of the Vosges, and which are often rich in bitumen, have by M. Blecher been determined to belong to the Tongrian stage. The deposits are sometimes marly and of deep-sea origin, at others sandy and littoral, according to the widening or narrowing of the zone between the Vosges and the Black forest. The vegetable fossils are numerous and remarkable.——M. Pomel considers the terrestrial deposits of the Sahara as forming two categories. The more ancient he places in the pliocene, and names Saharian. The author endeavors to show that, during the pliocene and quaternary, the maximum zone of precipitation was displaced northwards, and successively passed from the central Sahara to the Atlas, then to central, and lastly to northern Europe.

BOTANY.[1]

THE FERTILIZATION OF THE MULLEIN FOXGLOVE (SEYMERIA MACROPHYLLA).—The mullein foxglove is similar to the passion flower of Ohio in flowering for only one day. Both begin to flower early in the morning. Seymeria perishes with nightfall, the passion flower lasts till about midnight. The Seymeria is of a yellow color, has but a short tube and is wide at the mouth. Were it not for the numerous hairs in the throat of the tube, it would be of easy access to all classes of insects. The lower hairs seem to be in decided disorder, while those on the upper parts of the tube all point to the entrance. They serve as guards to the flower, of which the lower part of the throat is incurved so as to bring the tube together at that point. The middle lobe of the lower lip has a series of hairs on either side and between these rows of trichomes is a portion free from them (Fig. 1) so that the rows serve the bees as a guide, leading them by means of the smooth portion directly to the stamens and style beyond.

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[1] Edited by PROFESSOR C. E. BESSEY, Lincoln, Nebraska.

The lower stamens appear at either side of this groove at the corolla's throat (Fig. 1), the upper stamens are shorter and entirely included. The style is slightly shorter than the lower stamens and lies between them (Figs. 2 and 4) in such a way that if the bees fail to visit it, it can be self-fertilized, *i. e.*, if the pollen of its own flower is not impotent. The stamens are erect in the bud and the style is but slightly curved forwards. In the older flowers the style is often more curved, so as to bring it into more decided contact with any entering body. The stigma (Fig. 3) is not exactly lobed, but the harder tissues at its tip are lobed, and a softer layer of tissue lies between, exuding a sticky substance. The flower is therefore but poorly specialized for cross-fertilization, the hairs constituting its only special characters. I have noticed most of the visits by bees in the evening. In the middle of the day they seem to prefer other plants.—*Aug. F. Foerste, Granville, Ohio.*

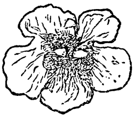
Fig. 1.

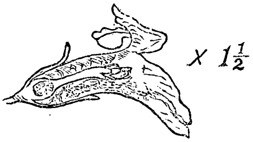

Fig. 2.

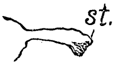

Fig. 3.

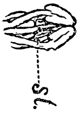

Fig. 4.

FIG. 1.—Flower from front view. FIG. 2.—Section of flower. FIG. 3.—The style. FIG. 4.—Stamens and style seen from below.

BOTANY IN KANSAS.—In the first number of the Bulletin of the Washburn Laboratory of Natural History Professor F. W. Cragin publishes lists of Kansas mosses, lichens, algæ and fungi. Of the mosses a dozen are given, determined by Eugene Rau. The lichens were identified by H. Willey, and number sixteen species and varieties. A dozen algæ are given, identified by Francis Wolle. The list of fungi includes only the Hymenomycetes, of which 158 species are enumerated. In this latter list are some new species, viz., *Agaricus alveolatus* Cragin, with a pitted pileus; *Trametes kansensis* Cragin, and *Dædalia tortuosa* Cragin. This bulletin gives promise of good work, and no doubt will do much to stimulate the collection and identification of the lower plants of the State.

FERTILITY OF HYBRIDS.—From a long article recently published by Thos. Meehan, we condense as follows, regretting that space will not permit its reproduction entire.—[*Ed.*]

The facts are that the recorded and undisputed cases of sterility in hybrids among plants are so rare that it would seem the onus should be on that side to prove the point. The writer does not know where to look for cases of undoubted hybrids among plants that are sterile. In most cases where reference is made it has been assumed that they were hybrids, because there was some difference in appearance from the normal form, or perhaps from the simple fact of sterility alone. The curious *Pyrus polvilleriana* in the garden of the museum at Paris is a case in point. This was known in Bauhin's time, and when the knowledge of hybridism was developed, believed to be a cross between an apple and a pear. It bore fruit, but it was thought there was no seed in them. But in 1860 Decaisne cut large numbers open and found thirteen seeds in 150 fruits. In 1864 sixty-two seeds were found in 139. Now the very fact of the fertility varying with different seasons shows that sterility was in relation to the structure in connection with external circumstances, rather than to any physiological imperfection in the reproductive organs themselves. In some other locations, where the circumstances should be uniformly as they were in 1864, we should have a tolerably fertile tree. Seedlings from the tree showed a relationship to *Cratægus aria*, and, indeed, from what we know of departures from normal types without any pretensions to hybridism, one may say that there is no fair reason for regarding this curious tree as a hybrid, or the sterility as having anything to do with the question of hybridization.

The writer has a tree certainly raised from *Halesia tetraptera*, certainly no hybrid, as there is nothing near for the parent tree to hybridize with, which is so different from the parent type that it can scarcely be called a Halesia. It is as sterile as the most famous hybrid could be. In short, sterility is well known to often follow the union of two individuals in the animal kingdom, and there are innumerable cases of sterility among individual plants. Sterility will often be characteristic of a whole race, and often of a whole species; and we may say positively that there is no more sterility among recognized hybrids than we find of every-day occurrence where hybridization is certainly out of the question.

But let us give the illustrations of fertility in hybrids:

* * * Flowering plants furnish the best evidence because we know the whole history. The writer of this raised the first hybrid fuchsia. *Fuchsia fulgens* was the male parent and *F. longiflora* the female, the latter being itself a garden form. These two belonging to different sections of the genus, are not only good species, but have been regarded as of distinct genera. The progeny of these hybrids were fertile. Other hybridists used equally distinct species for the male parents, such as *F. corymbiflora* and *F. serratifolia*. All the numberless garden varieties now in existence have been raised from these original hybrids. Many successive generations have been raised. There are some sterile individuals occasionally, but not more than is found with individuals with normal species. The writer also obtained hybrids be-

tween Gesneraceous plants of two genera, *Gloxinia rubra* and *Sinningia guttata.* These were fertile. Indeed, European florists have united many supposed genera in this order. Conservatories teem with them. The writer never saw a sterile one. This is also true of Begonia. Large numbers of those in our conservatories are hybrids, all fertile. * * * * All our garden Gladioli are fertile. The original of these forms is a hybrid between *Gladiolus cardinalis* and *G. floribundus.* Our garden geraniums and pelargoniums are from many very distinct species, so distinct in appearance and general character that they might almost be regarded as distinct genera. Their offspring are occasionally sterile, but with these very few exceptions are as fertile through many score of generations as the originals. * * * * The Cape heaths of our greenhouses—species of Erica—have remarkably distinct forms among them, yet any of them hybridize freely and produce offspring as fertile as their parents. * * * * In the history of American fruits we find remarkably strong evidence for the fertility of hybrids. * * * The history of the grape in America is one of a long succession of fertile hybrids, though perhaps the distinctness of the species might be a question. There is such a regular gradation that no one can refer a form in every case to its proper species. Still, when we take the wild fox grape and compare it with the grape of European vineyards, or a scuppernong and a fox grape, all will admit that in no sense can these be regarded as one species. Yet they all hybridize, and the hybrids are fertile. * * *

M. Naudin, a very energetic French experimenter with hybrid plants, gives as the results of his observations that never more than twenty-five per cent of hybrids were sterile, and of these numbers had fertile pollen; but even this proportion may have had more to do with the climate or surroundings than with absolute sterility. In America, so far as the writer of this has had the opportunity to observe, there is no reason to believe there is any more sterility attached to hybrids than to ordinary plants.—*The Independent.*

THE YOUNGER SCHOOL OF BOTANISTS.—In a recent number of *Nature* Rev. Geo. Henslow spoke of the "evil effects of the younger school of botanists not recognizing the importance of first training students in a thorough course of practical and systematic botany before proceeding to laboratory work." To this W. T. Thistleton Dyer replies with some warmth: "I am afraid I am not wholly free from some responsibility for the proceedings of 'the younger school of botanists,' the effects of which he regards as evil. In the face of the successful revival in this country of many branches of botanical study which the younger school has effected, I am emphatically of the opinion that these effects are the reverse of evil. I believe I was one of the first to organize a course of so-called laboratory work in botany on lines which it is only right to say were borrowed and extended from the teaching and example of Professor Huxley. In what I attempted I had the generous aid of many now distinguished members of the younger school. I do not doubt that they have immensely improved on the beginning that was in the first instance somewhat tentatively made. But the principle, I believe, has always remained the same, namely, to give the students a thorough and practical insight into the organization and structure of the leading types of the vegetable kingdom. When, therefore, Mr. Henslow, himself a teacher, asserts that such laboratory teaching as this should be preceded by a thorough course of practical and systematic botany, it appears to me that he is bound to explain what he precisely means by this very dark saying. For if botanical laboratory work in this country is not thorough, is not practical, and in dealing with types drawn from every important group is not systematic, it is important to know in what respects it falls short of these requirements."

NEW SPECIES OF NORTH AMERICAN FUNGI.—*Septoria purpurascens.*—Hypophyllous on small reddish-purple spots without any definite border, and often confluent so as to give a purplish discoloration to large areas of the leaf; perithecia prominent, scattered, collapsing above, 150-190μ in diam.; spores fusiform, hyaline, slightly curved, endochrome thrice divided, 30-50 × 3μ On leaves of *Potentilla norvegica*, Adirondack mountains, N. Y., Aug., 1883. Collected by Dr. Geo. A. Rex. This can hardly be *S. sparsa* Fckl., which has spores narrowly filiform and straight, nor *S. fragariæ* Lasch., which has spores shorter and broader at one end. *S. potentillæ* Fckl., is a Gloeosporium and quite different.

Pestalozzia scirpina.—Seated under the cuticle through which the black mass of spores is visible. Conidia fusiform, 4-septate, brownish-black except the hyaline extremities, 20-25 × 6-7μ; crest mostly 3-parted, cilia spreading, 18-24 × ½-¾μ; pedicels about 10μ long. The conidia at length ooze out and stain the surface of the matrix. On culms of *Scirpus maritimus.* Collected by Dr. J. T. Rothrock in Maryland, July, 1884. *Epicoccum sphærospermum* Berk., and *Macrosporium scirpi* Lasch? also occur on the same culms.

Cercospora racemosa.—In small (1–2$^{\text{mm}}$) patches, greenish-white at first then brown and often subconfluent; hyphæ interwoven, branched, hypophyllous brown, 200 × 4-6μ. Conidia oblong-cylindric, sub-hyaline, 1-5 septate, 20-80 × 3-6μ, borne in a racemose manner at the tips of short lateral branches. Differs from the usual type of Cercospora in its lateral conidia and scarcely tufted hyphæ. Collected at Charles City, Iowa, Sept., 1882. On leaves of *Teucrium canadense*, by Professor J. C. Arthur.

Ovularia monilioides.—On reddish-brown, round spots, 1-4^{mm} in diameter; hyphæ fasciculate, hyaline, sparingly septate and often branched above, 35-50 × 3μ; conidia concatenate, 2-4 connected, obovate, hyaline, 12-17 × 9-12μ. On leaves of Myrica. Collected at Magnolia, Mass., June, 1884, by Miss C. H. Clarke.

Sphærella platani E. & M.—On round (2–4^{mm}) reddish-brown spots with a narrow dark but only slightly raised border. Perithecia epiphyllous, innate-erumpent (90-120μ); asci oblong 8-spored, 40-60 × 12-15μ, nearly sessile, sporidia subhyaline, ovate-oblong, 1-septate and constricted, nucleate, 14-16 × 4-6μ. Quite distinct from *S. platanifolia* Cke. On living leaves of *Platanus occidentalis.* On the same leaves, on similar spots, is a Phyllosticta which can hardly be distinguished from the Sphærella except by microscopical examination. Perithecia epiphyllous, black, about 100μ in diameter; spores oblong-elliptic, brownish, faintly nucleate, 5-6 x 2.5-3μ.—*J. B. Ellis, Newfield, N. J., and Dr. Geo. Martin.*

Botanical Notes.—The October number of *The Microscope* contains an article, by Mrs. L. R. Stowell, on the microscopic structure of *Hydrastis canadensis*, accompanied by two good plates.——Professor Trelease's paper in the Aug.-Sept. number of *Psyche*, Notes on the Relations of two Cecidomyans to Fungi, has a botanical as well as an entomological interest.——The last number (Oct.-Nov.) of the *Botanical Gazette* is devoted to the botanical aspect of the American Association for the Advancement of Science. Short abstracts are given of the more important papers read before the association and the Botanical Club. An account is given of the excursions of the club, and finally the whole is summed up in an editorial note upon the results of the Philadelphia meeting, in which, after pointing out the good results which the meeting accomplished, the editor properly criticises "the low average quality of the botanical papers presented before the association." In spite of the fact that the attendance included "some of the most distinguished names of the science in this country, the botanical communications in no instance exhibit that profound research or comprehensive statement of laws or relationships, or other characteristics that would entitle them to rank with the better papers presented by the zoölogists, physicists or chemists." We most heartily endorse the remark that "it lies with individual workers to see that this does not remain so."

ENTOMOLOGY.

C. Emery on the Fire-fly of Italy.—Luciola is one of the Lampyrid beetles, differing from Lampyris chiefly by the head being less deeply sunk in the prothorax. Both male and female have wings and elytra, the male has only six abdominal segments against seven in the female; but the terminal segment of the